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## ABSTRACT

Using the counting features in previous mean length of utterance (MLU) studies, a study of the active vocabularies of adolescents looked at seven concrete features of the words 104 seventh grade and 100 eleventh grade subjects gave in response to 10 pictures. Each subject wrote five words for each of the pictures, which were analyzed for number of phonemes, syllables, prefixes, combining forms, and derivational suffixes. Each word was assigned a part of speech and a standard word frequency index value found in the American Heritage Word Frequency Book. The results indicated that the prefix variables were most consistent in indicating significant differences between the vocabularies of the two grade levels. After the second response for each of the pictures, phoneme count and the probability statistic for appearing in print distinguished between the vocabularies for these two groups. The third and fifth response differentiated the two vocabulary levels best with the third yielding significant differences for all the variables except for part of speech. The fifth response did not yield data that differentiated for the variables identified as part of speech and derivational suffixes. (HTH)

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Concrete Features of Vocabulary Development

From Puberty Through Adolescence

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Using the concept of mean length of utterance (MLU) researchers (Cazden, 1972; Bloom, Hastings and Madaus, 1971; Menyuk, 1962; Cowan et al., 1967) have studied the number of morphemes in the utterances of young children. Beyond the utterances of young children the focus on vocabulary development is usually on the semantic perception of subordinate-superordinate relationships within conceptual categories (Anglin, 1970; Miller, 1969; Katz and Postal, 1964).

Using the counting feature in the MLU studies, this study looked at seven concrete features of the words 104 seventh-grade and 100 eleventh-grade subjects gave in response to ten pictures. Each subject wrote five words for each of the pictures for a total of 50 words per subjects. These words were analyzed for number of phonemes, syllables, prefixes, combining forms and derivational suffixes. Each of the words was identified as being either a noun, verb, adjective, adverb or other by assigning to each the first part of speech given to each in the Webster College Dictionary. Nouns were assigned a 1, verbs a 2, adjectives a 3, adverbs a 4, and other a 5. These data yielded a mean for lexical variation.

Each word subjects produced was assigned the standard frequency index (SFI) value found in the American Heritage word frequency study book. (Carroll, 1971). The SFI value is a statistical probability of a word appearing in printed educational materials used in grades three through nine. A word with an SFI value of 90 would be expected to occur once in every 105 words; one with a value of 80 should be expected to occur once in every 100 words. An SFI of 40 is the value

of a word that would occur once in a million. Each SFI unit of 10 represents an increase of about 25.9% in probability of occurring in educational materials used in grades three through nine.

The word the has the highest SFI value of 88.6. The word trespasses has the lowest value for 02.5. SFI values were included in this study because it is assumed that subjects who produced words having lower SFI values may have vocabularies of greater depth and breadth than those giving responses having higher SFI values.

#### The Subjects

Subjects attended schools in two Southern New Mexico communities. One of the communities has a population of approximately 2,500; the other about 10,000. Thirteen of the 104 seventh-grade subjects indicated they are Spanish-English bilinguals; 24 eleventh-grade subjects identified themselves as being Spanish-English bilinguals.

The subjects reported the following occupations for their parents. The numerals to the right of the occupations in the columns designated seventh-grade and eleventh-grade indicate the number of subjects having parents in these occupations.

| Parental Occupations             | 7th-grade | 11th-grade |
|----------------------------------|-----------|------------|
| 1. Creative: art, crafts, music, | 3         | 4          |
| writing, entertainment,          |           |            |
| photography and communi-         |           |            |
| cations                          |           |            |

| Parental Occupations                                              | 7th-grade | 11th-grade |
|-------------------------------------------------------------------|-----------|------------|
| 2. Counseling, guidance, social<br>work and personal service      | 11        | 22         |
| 3. Medicine and health                                            | 5         | 4          |
| 4. Business relations and<br>merchandising                        | 30        | 14         |
| 5. Secretarial and clerical                                       | 1         | 4          |
| 6. Education and training                                         | 3         | 8          |
| 7. Math, science, and engineering                                 | 9         | 7          |
| 8. Farming, fishery and forestry                                  | 3         | 26         |
| 9. Investigating, inspecting,<br>testing, law and law enforcement | 10        | 4          |
| 10. Machine work and transportation                               | 29        | 7          |

Each subject gave his or her career aspiration.

| Subject Career<br>Aspiration                | 7th-grade | 11th- grade |
|---------------------------------------------|-----------|-------------|
| 1. Art                                      | 5         | 1           |
| 2. Business relations                       | 3         | 8           |
| 3. Clerical work                            | 5         | 9           |
| 4. Counseling, guidance, and<br>social work | 1         | 1           |
| 5. Crafts                                   | 2         | 1           |
| 6. Education and training                   | 11        | 8           |
| 7. Engineering                              | 4         | 7           |
| 8. Entertainment                            | 6         | 2           |
| 9. Farming, fishing and forestry            | 9         | 24          |
| 10. Home                                    | 0         | 3           |

| Subject Career<br>Aspiration                 | 7th-grade | 11th-grade |
|----------------------------------------------|-----------|------------|
| 11. Investigating, inspecting and<br>testing | 1         | 0          |
| 12. Law and law enforcement                  | 7         | 4          |
| 13. Machine work                             | 10        | 8          |
| 14. Managerial and supervisory work          | 0         | 1          |
| 15. Mathematics and science                  | 4         | 5          |
| 16. Medicine and health                      | 10        | 8          |
| 17. Merchandising                            | 0         | 0          |
| 18. Music                                    | 1         | 3          |
| 19. Personal service                         | 2         | 4          |
| 20. Photography and communications           | 3         | 1          |
| 21. Transportation                           | 19        | 1          |
| 22. Writing                                  | 1         | 1          |

#### The Pictures

Eight of the pictures came from A Century of American Illustration (1972), published by the Brooklyn Museum. Among these eight illustrations are caricatures and cartoons that depict pensiveness (The Rat, Paul Davis, 1970), anguish/dejection (School Days, F.X. Leyendecker, 1915), shock (Good-gracious Matilda -- you too?, Theodore Geisel, 1931), captured/ensnared (Vladimir Nabokov, David Levine, 1967), confutation (Dick Gregory Poster, Milton, Glaser, 1969), fright (He jumped up and lashed his tail, Harrison Cady, 1907), imagination (The Photographer and the Model, Ralph Barton, 1930), and rejecting or defending against romantic advance (How to handle wild men and really serious

things like that, John Held, Jr., 1929).

One picture was taken from Private Realities: Recent American Photography, (1974), published by the Boston Museum of Fine Arts. It was taken by Cary Wasserman in 1973 and designated as Magnolia No. 1, Pink Rock. It is surrealistic and was included among the ten for the purpose of stimulating subjects to produce polysyllabic and morphemic words. It is a picture of an oak tree levitating above a pond. A smaller image of the tree hovers over the mountain in the background.

The tenth picture came from Hills of Home Rural Ozarks (1975), photographs by Roger Minick, writings by Bob Minick and drawings and etchings by Leonard Sussman. The photograph is entitled, Two Chairs on Pierce Porch. The photograph can cause one to recall lonely and melanchollic experiences.

#### Data Collection

Each subject had a photostatic set of these ten pictures. Each set of pictures had the same order. Along with the set of pictures subjects received a single-page-form containing ten five-space sections numbered 1 through 10. Subjects were instructed to write five different words for each picture. They wrote the words for the first picture in the five-space section for this picture and continued this through picture 10.

#### Data Analysis

Correct spelling and psychological implications were not considered. If a word like family was spelled famly, it was

recorded as though it had been spelled and pronounced according to standard English. If a numeral was an entry, it was analyzed according to its pronunciation. For example, if rodent was a response, the analysis of it would have been:

Number of phonemes: 5  
 Number of syllables: 2  
 Part of speech: Noun  
 Prefix: 0  
 Root: 1 (rod - to grow)  
 Derivational suffix: 1 (ent - a person or thing that)  
 SFI value: 27.2

For statistical interpretation, the data were organized according to the order of the responses given for each of the ten pictures. Since there were five responses for each picture, the organization of the data was in five arrays with each array crossing through seven columns. Each array had a line of data for seventh-grade subjects and one for the eleventh-grade. It looked like this:

#### Data Organization for Statistical Interpretation

| Response<br>Grade | SFI<br>Value | Phoneme<br>Count | Syllable<br>Count | Prefix<br>Count | Combining<br>Form | Suffix<br>Count | Lexical<br>Count | Variation |
|-------------------|--------------|------------------|-------------------|-----------------|-------------------|-----------------|------------------|-----------|
| 1 7               |              |                  |                   |                 |                   |                 |                  |           |
| 11                |              |                  |                   |                 |                   |                 |                  |           |

There were five of these with each of the five containing the ordinal response across the ten pictures. No data for an individual picture were analyzed separately. Thirty-five  $t$  tests were run to determine if in this grid of 35 comparisons did any of the performances of seventh- and eleventh-grade subjects differ at or greater than  $p > .05$ .

#### The Results

Within the grid of thirty-five pairs of means for the seven variables sixteen sets are significantly different at or greater than  $p > .05$ . All the sets of means in the prefix column differ at or greater than  $p > .01$ . This is the only column of mean sets in which all of them differed significantly.

For the responses that create arrays one and two, only three of the fourteen sets of means were significantly different at or greater than  $p > .01$  while there were eight sets of means differing at or greater than  $p > .05$  in arrays four and five. Six of the seven sets of means in the third array were significantly different at or greater than  $p > .004$ . The third response given for each of the ten pictures distinguished most between the vocabulary of the seventh- and eleventh-grade subjects.

Table 1. Grid of 35 sets of means and statistical differences

| Response | Grade | SFI<br>Values | Phoneme | Syllable | Prefix | Combining<br>Form | Derivational<br>Suffix | Lexical<br>Variation |
|----------|-------|---------------|---------|----------|--------|-------------------|------------------------|----------------------|
| 1        | 7     | 54.58         | 4.44    | 1.55     | 0.025  | 0.339             | 0.238                  | 1.49                 |
|          | 11    | 54.87         | 4.56    | 1.65     | 0.052  | 0.360             | 0.256                  | 1.47                 |
| P >      |       |               |         | .003     | 0.002  |                   |                        |                      |
| 2        | 7     | 55.37         | 4.47    | 1.53     | 0.038  | 0.377             | 0.287                  | 1.63                 |
|          | 11    | 55.22         | 4.57    | 1.59     | 0.061  | 0.394             | 0.317                  | 1.64                 |
| P >      |       |               |         |          | .01    |                   |                        |                      |
| 3        | 7     | 55.16         | 4.45    | 1.54     | 0.039  | 0.383             | 0.317                  | 1.64                 |
|          | 11    | 53.94         | 4.86    | 1.69     | 0.088  | 0.471             | 0.389                  | 1.71                 |
| P >      |       | .004          | .0001   | .0001    | .0001  | .0009             | .002                   |                      |
| 4        | 7     | 55.07         | 4.56    | 1.57     | 0.031  | 0.418             | 0.350                  | 1.67                 |
|          | 11    | 54.18         | 4.80    | 1.63     | 0.074  | 0.440             | 0.388                  | 1.70                 |
| P >      |       | .03           | .002    |          | .0004  |                   |                        |                      |
| 5        | 7     | 55.51         | 4.47    | 1.55     | 0.043  | 0.384             | 0.323                  | 1.74                 |
|          | 11    | 54.70         | 4.76    | 1.66     | 0.083  | 0.435             | 0.357                  | 1.79                 |
| P >      |       | .04           | .0001   | .002     | .0003  | .05               |                        |                      |

This molar grid of the study shows that eleventh-grade subjects' performances produced 33 out of a possible 35 means which indicate their vocabularies to be more sophisticated than seventh-grade subjects. The only seventh-grade SFI mean smaller than those for eleventh-grade subjects is the one for the first response set which is 54.58 vs. 54.87. They are not significantly different. The smaller SFI mean indicates those words in that response set have a lower frequency of appearing in print.

The other mean indicating a more sophisticated performance for seventh-grade subjects is found under lexical variation for the first response set (1.49 vs. 1.47). Lexical variation proved not to be a feature that could significantly distinguish seventh-grade subjects' vocabularies from those of eleventh-grade subjects.

Derivational suffixes were only a distinguishing feature in the third set of responses. For this set of means  $p > .002$  which indicates greater productive vocabulary competence for eleventh-grade subjects. The third set of responses contain words having characteristics that differentiate more consistently the vocabularies of seventh- and eleventh-grade subjects. Six of the seven sets of means are significantly different at or greater than  $p > .004$ .

Response set five has four sets of means significantly different at or greater than  $p > .05$ . Words in response sets three and five revealed greater distinction between the vocabulary vocabularies of seventh- and eleventh-grade subjects.

The molar view statistics provide is insightful. However, seeing the parts of the whole also reveals the sources of the statistics which must be understood to thoroughly appreciate the molar view. For this reason the frequency data for words varying in phonemic, syllabic, prefix, combining form and derivational suffix counts are given.

Charts 2, Frequencies of Words Ranging in Length from 1 to 14 Phonemes, and 3, Frequencies for Syllables, Prefixes, Combining Forms, Derivational Suffixes and Lexical Variation, show that eleventh-grade subjects produced more words having greater linguistic complexity than those produced by seventh-grade subjects. Looking at the number of words having from eight to fourteen phonemes for each of the five sets of responses reveals that eleventh-grade subjects produced more of these words. For responses in Set one, it is 62 words for the seventh-grade subjects and 81 for eleventh-grade subjects; for Set 2: 56 vs. 26; Set 3: 58 vs. 99; Set 4: 83 vs. 92; and Set 5: 64 vs. 88.

This same pattern is evident in words having three or more syllables. These data are: Set 1: seventh-grade subjects' 103 vs. eighth-grade subjects' 138; Set 2: 97 vs. 133; Set 3: 86 vs. 143; Set 4: 98 vs. 116; and Set 5: 87 vs. 129.

Eleventh-grade subjects produced more words having prefixes than did seventh-grade subjects. For Set 1, the difference is 25; 21 for Set 2; 46 for Set 3; 34 for Set 4 and 36 for Set 5. Eleventh-grade subjects produced 161 more words having prefixes than did

Table 2. Frequencies of words ranging in length from 1 to 14 phonemes

| Number<br>of<br>Phonemes | Response<br>Set<br>Grade | Phoneme Count |      |     |      |     |      |     |      |     |      |
|--------------------------|--------------------------|---------------|------|-----|------|-----|------|-----|------|-----|------|
|                          |                          | 1             |      | 2   |      | 3   |      | 4   |      | 5   |      |
|                          |                          | 7th           | 11th | 7th | 11th | 7th | 11th | 7th | 11th | 7th | 11th |
| 1                        |                          | 5             | 6    | 6   | 4    | 6   | 1    | 9   | 3    | 9   | 2    |
| 2                        |                          | 6             | 13   | 9   | 19   | 17  | 18   | 23  | 22   | 26  | 22   |
| 3                        |                          | 339           | 317  | 328 | 297  | 326 | 241  | 279 | 236  | 280 | 243  |
| 4                        |                          | 289           | 259  | 277 | 252  | 269 | 245  | 281 | 246  | 284 | 267  |
| 5                        |                          | 183           | 169  | 203 | 192  | 211 | 205  | 216 | 208  | 228 | 201  |
| 6                        |                          | 106           | 98   | 99  | 95   | 99  | 125  | 95  | 124  | 104 | 114  |
| 7                        |                          | 50            | 57   | 62  | 65   | 54  | 66   | 54  | 69   | 45  | 63   |
| 8                        |                          | 43            | 50   | 38  | 49   | 38  | 49   | 55  | 56   | 47  | 35   |
| 9                        |                          | 12            | 11   | 7   | 17   | 8   | 21   | 20  | 16   | 9   | 24   |
| 10                       |                          | 2             | 9    | 5   | 6    | 1   | 16   | 4   | 14   | 7   | 20   |
| 11                       |                          | 2             | 6    | 2   | 1    | 7   | 8    | 3   | 6    | 1   | 9    |
| 12                       |                          |               | 4    | 1   | 2    |     | 3    |     |      |     |      |
| 13                       |                          | 3             |      | 3   | 1    | 3   | 2    | 1   |      |     |      |
| 14                       |                          | 1             |      |     |      | 1   |      |     |      |     |      |

Table 3. Frequencies for syllables, prefixes, combining forms, derivational suffixes and lexical variation.

| Vocabulary Features   | Response Set Grades | 1     |      | 2     |      | 3     |      | 4     |      | 5   |      |
|-----------------------|---------------------|-------|------|-------|------|-------|------|-------|------|-----|------|
|                       |                     | 7th   | 11th | 7th   | 11th | 7th   | 11th | 7th   | 11th | 7th | 11th |
| Syllables             |                     |       |      |       |      |       |      |       |      |     |      |
| 1                     |                     | 577   | 527  | 594   | 569  | 584   | 497  | 568   | 507  | 575 | 516  |
| 2                     |                     | 360   | 335  | 349   | 298  | 370   | 360  | 374   | 377  | 378 | 345  |
| 3                     |                     | 93    | 102  | 83    | 110  | 67    | 104  | 80    | 96   | 70  | 110  |
| 4                     |                     | 9     | 30   | 10    | 19   | 16    | 29   | 12    | 17   | 12  | 22   |
| 5                     |                     |       | 1    | 4     | 4    | 2     | 10   | 5     | 3    | 4   | 6    |
| 6                     |                     |       | 1    |       |      | 1     |      | 1     |      | 1   | 1    |
| Prefixes              |                     |       |      |       |      |       |      |       |      |     |      |
| 0                     |                     | 1,013 | 948  | 1,000 | 939  | 1,000 | 914  | 1,007 | 932  | 996 | 919  |
| 1                     |                     | 27    | 52   | 40    | 61   | 39    | 85   | 33    | 67   | 43  | 79   |
| 2                     |                     |       |      |       |      | 1     | 1    |       | 1    | 1   | 2    |
| Consuming Forms       |                     |       |      |       |      |       |      |       |      |     |      |
| 0                     |                     | 752   | 699  | 707   | 660  | 689   | 591  | 657   | 598  | 687 | 615  |
| 1                     |                     | 223   | 242  | 275   | 287  | 304   | 348  | 332   | 365  | 309 | 335  |
| 2                     |                     | 65    | 59   | 58    | 53   | 47    | 61   | 51    | 37   | 45  | 50   |
| Derivational Suffixes |                     |       |      |       |      |       |      |       |      |     |      |
| 0                     |                     | 818   | 763  | 761   | 701  | 732   | 642  | 706   | 636  | 730 | 658  |
| 1                     |                     | 196   | 218  | 259   | 282  | 288   | 327  | 304   | 340  | 284 | 327  |
| 2                     |                     | 26    | 19   | 20    | 17   | 20    | 31   | 30    | 24   | 26  | 15   |
| Lexical variation     |                     |       |      |       |      |       |      |       |      |     |      |
| Noun                  |                     | 767   | 739  | 675   | 638  | 679   | 601  | 664   | 607  | 616 | 564  |
| Verb                  |                     | 37    | 53   | 74    | 80   | 58    | 85   | 59    | 83   | 78  | 80   |
| Adjective             |                     | 231   | 203  | 286   | 278  | 301   | 307  | 310   | 306  | 339 | 353  |
| Adverb                |                     | 5     | 4    | 5     | 3    | 2     | 1    | 7     | 1    | 7   | 1    |
| Other                 |                     |       | 1    |       | 1    |       | 6    |       | 3    |     | 2    |

seventh-grade subjects. The total number of words produced by seventh-grade subjects was 5,200 ( $50 \times 104 = 5,200$ ). For eleventh-grade subjects it is 5,000 ( $50 \times 100 = 5,000$ ).

Seventh-grade subjects in all sets of responses produced more words without combining forms while eleventh-grade subjects produced more words having combining forms. This happened for words having derivational suffixes, too.

While lexical variation is not a feature that distinguished the vocabulary of seventh-grade subjects from that of eleventh-grade subjects, it is interesting to see that subjects produced more responses that are not nouns as they moved away from the first response to each of the pictures. This increase included both verbs and adjectives, with the latter being much greater in number.

#### Conclusion

This study of the active or productive vocabularies of seventh- and eleventh-grade students produced results that show the concrete characteristics of the number of phonemes, syllables, prefixes, combining forms and derivational suffixes are elements to focus on when researching vocabulary development in humans beyond infancy. A probability statistic for a word appearing in print also adds when assessing the depth and breadth of the vocabulary one speaks.

A study of active vocabulary may prove to be more meaningful in assessing competency in vocabulary than that of having students respond to words seen or heard. In a series of five responses to a picture, the third and fifth response may be more indicative of vocabulary competence. The use of prefixes is the characteristic that distinguished best between the vocabularies of seventh- and eleventh-grade subjects.

In a series of five responses, the number of phonemes in a word and a probability statistic for appearing in print are consistent features after the second response that distinguish between the vocabularies of seventh- and eleventh-grade subjects.

### Summary

Vocabulary development from the onset of puberty through adolescence is the focus of this study. One-hundred-five seventh-grade (ages 11 and 12) and one hundred eleventh-grade (ages 16 and 17) subjects produced fifty words each for a total of 10,200 words. Subjects responded to ten different pictures by writing five words per picture. The words were analyzed with reference to the number of phonemes, syllables, prefixes, combining forms, derivational suffixes, and part of speech. Also, a statistical probability for appearing in print was obtained for each word by referring to the American Heritage Word Frequency Book.

Thirty-five t tests were run to determine how many of the seven variables differentiated, at least at  $p > .05$ , the vocabularies of seventh- and eleventh-grade subjects. The prefix variable was the most consistent in indicating a significant difference between the vocabularies of seventh- and eleventh-grade subjects. After the second response for each of the pictures, phoneme count and the probability statistic for appearing in print distinguished between the vocabularies for these two groups. The third and fifth response differentiated the two vocabularies best with the third yielding significant differences for all the variables except for part of speech. The fifth response did not yield data that differentiated for the variables identified as part of speech and derivational suffixes.

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